EXPLORATION OF THE BLACK SEA.

WE learn from the *Proceedings of the Royal Geographical Society* for March that Professor Woeikof, at a recent meeting of the Society of Friends of Science of Moscow, communicated some results of the scientific exploration of the Black Sea in the Russian gunboat "Tchernomoretz" in June and July, 1890. The mean depth in the basin is 6,000 feet. The minimum depth (below 600 feet) was found in the north-west region, bounded by a line passing from Varna, in Bulgaria, to Eupatoria, on the west coast of the Crimea; and the maximum depth (7,365 feet), in the central part, between the Crimea and Anatolia. The surface temperature varies from 72° F. in the centre of the basin, to from 75° to 77° on the west and east. At a depth of from 29½ feet to 174 feet, the temperature was only 57° towards the south coast, 54° in the centre, and 52° in the north and near the west and east shores. The variation of temperature in the Black Sea is very characteristic at depths exceeding 180 feet. At this point the thermometer marks only 45°; but then the temperature begins to rise, and at a depth of 6,000 feet it is 49°. In other seas, in mean latitudes, the temperature diminishes regularly from the surface to the bottom, or rather below a certain depth it remains invariable (56° for the Mediterranean).

Another peculiarity of the Black Sea is, that at a depth of 450 feet, traces of sulphuretted hydrogen are found, the proportion of which increases so rapidly that it becomes quite sensible at 600 feet; and at 940 feet, and under, it renders animal life entirely impossible. At that depth were found only the semi-fossil shells of certain mollusks characteristic of the brackish water of the lagoons of the Black Sea and of the Caspian. They are the remains of the Pontic fauna which inhabited the Black Sea at the pliocene epoch, when this basin, still separated from the Mediterranean, and with a depth of only 3,000 feet, contained water of but feeble salinity. At the opening of the Bosporus, the waters of the Mediterranean would make their way into the Black Sea, and lead to the disappearance of the ancient fauna. The sulphuretted hydrogen, then, is only one of the products of the decomposition of these ancient organisms, the elimination of which takes place very slowly, owing to an immobility almost absolute of the water at a certain depth.

The Black Sea receives annually, by way of the Bosporus, only a thousandth part of the total volume of water in the basin, and consequently it will take a thousand years to completely renew the whole contents of the basin. It is thus easy to understand the slowness with which the deep waters participate in the circulation of the liquid mass.

THE VEGETABLE FIBRES OF TRINIDAD.

THE United States consul in Trinidad has recently forwarded to the government a report upon the vegetable fibres of that island, and gives a description of some of the most important of them.

The *maholtine* is a plant which grows wild in large quantities. It is easily cultivated by simply cutting down bushes and burning them, and scattering the seeds of the plant. One acre of good ground will produce about five thousand pounds of stalk; and this stalk, reduced to fibre, will make about eight hundred pounds. The stalk grows from eight to twelve feet, the skin or bark of which is stripped off, and steeped in cold water, eight or ten days after which the green watery substance is washed out, leaving a fibre eight to ten feet long.

The white *mahoe* (*Sterculia caribœa*), like the *maholtine*, grows wild, and may be cultivated in the same way, producing the same quality of fibre. The fibre is whiter and more silky than that of the *maholtine*, and is believed to be superior to it, although it has never been sent abroad to test its merits. A crop is reaped every seven months.

The *gumbo*, or *okra* (*Abelmoschus esculentus*), is another stalk fibre, the plant growing six to eight feet high, and producing a fibre about the same length. Cultivated on good soil, it will produce four thousand pounds of stalks, yielding as much fibre to the pound as the *maholtine* or the white *mahoe*.

The fibre of the *gumbo*, unlike those above mentioned, will not contain water, but throws it off like oil silk. A crop is harvested every seven months.

The plantain (*Musa sapientum*) will produce from five to six pounds of fibre to each stalk. The stalks grow from eight to nine feet high, and eight hundred of them may be produced on an acre of ground. The fibre is obtained by putting on two wooden rollers, and rolling and squeezing the stalks to crush the watery pores, then steeping it in water eight to ten days, and finally putting it under the same rolling process with heavier weights.

The banana (*Musa paradisiaca*) grows four to five feet high, produces two to three pounds of fibre to the stalk, and eight hundred stalks to the acre, and the crop is annual.

Ramie, or China-grass, grows very thickly, and, when once planted, sustains itself against other grass. After the first year, it can be cut every six months. The stalk grows about four feet high. It will produce an ounce of fibre to every square foot. The plant was imported into Trinidad from China for experimental purposes about three years ago, and has not yet assumed any commercial importance.

The *mahoe bord du mer* (*Paritium tiliaceum*) does not grow inland, but on the seashore. It is a stalk fibre, but, unlike the above, it branches, and the branches also produce fibre. It grows eight to fifteen feet high. Each tree will produce about half a pound of fibre, and one acre can support eight hundred trees.

Red *mahoe* (*Sterculia caribœa*) grows wild on any soil of the island, produces about eight hundred trees to the acre, grows eight to ten feet high, and then branches. The stalk and branches are both used for fibre, which is used by the natives for making rope. The crop is annual.

Rucon, or annotto, an Indian plant from South America, is a very strong fibre. One acre will support eight hundred stalks cultivated on fertile soil, and each stalk will produce about half a pound of fibre.

Black sage (*Cordia cylendros*) is a small shrub about six feet high, and produces a very strong fibre, used by the natives for making ropes. An acre of ground will support sixteen hundred plants, and they will give one-fourth of a pound of fibre to each plant.

Bois sang, or blood-wood, grows twenty-five feet high, and branches out eight to ten feet from the bottom. When tapped, the tree emits a fluid resembling blood, which produces a red stain. Both stem and branches produce fibre. About six hundred trees may be produced to the acre, and each tree will produce two to three pounds of fibre, which is used for rope-making. The fibre varies from four to six feet in length, is very tough, and would, it is said, make a superior twine for bagging. It is cut and planted every three years.

Balizier (*Hilicomea*) is a wild plant, grows on cool soil, and its presence indicates superior land. The blades, which resemble the blades of the plantain, produce the fibre; but the blades grow from the roots of the bush like a pine-apple, and they are six to ten feet long. One acre will produce about ten thousand blades, and each blade will produce half an ounce of fibre. It is a coarse fibre, not so strong as the others mentioned, but is useful for door-mats and similar purposes.

Cacao (*Theobroma*) is cultivated for its valuable fruit; but the tree, which grows fifteen or twenty feet high, is trimmed annually in the spring of the year, and the branches of each tree thus trimmed will produce half a pound of fibre, which varies from three to five feet in length. It is strong, and is used as rope for making hammocks.

Bois l'ome (*Guazuma ulmifolia*) is a straight tree. At a distance of eight or ten feet up the body of the tree, five or six branches shoot out in a circle round it; and, from this point to the top of the tree, encircling branches shoot out at the distance of about one foot apart. The lowest circle of branches are the longest, and they shorten as they ascend the tree, causing the tree to assume the shape of a sugar-loaf. Both the body and branches produce fibre. It is a straight brown fibre, and very strong, used generally for rope and twine making. Eight hundred trees may be produced to the acre, and, after the third year, will produce annually from one to two pounds of fibre to the tree.

The *Agave Mexicana* grows three or four feet high, and one

acre will support twenty-five hundred plants. After three years, each blade will produce half an ounce, or about half a pound to the plant. The crop may be reaped each succeeding year for from twelve to sixteen years without replanting. The plant becomes dry and worthless as soon as it produces a flower; but it rarely produces the flower before twelve years, and usually not before sixteen or twenty years. The plant grows wild on the island, but it is understood to have originally been brought from Mexico. The fibre is three to four feet long, fine, strong, and, it is said, would doubtless be good for textile purposes.

The *Agave Americana*, or American aloe, grows higher than the *Agave Mexicana*. It varies in height from four to five feet, and the fibre is the same length. It grows abundantly, chiefly near the seashore, and is understood to be a native of the island. The fibre is coarser than the Mexican agave, but about the same quantity can be produced to the acre.

Of the pine-apple (*Ananassa sativa*), only the blade, which is about two feet long, produces fibre. The fibre is strong and fine, and is believed to be well-suited for textile manufactures. It is of finer texture than either the American or Mexican agave.

Agave rigida, or sisal hemp, has lately been introduced into Trinidad. The blades alone, which grow about two and a half to three feet long, are used for fibre. Eight blades, it is said, give an ounce and a half of fibre, and the fibre obtained is about three feet long, strong, coarse, and stiff, suitable, it is believed, for strong ropes and chair-bottoms. An acre will support two thousand plants of about sixteen blades each, and calculated to produce at each reaping three ounces of fibre to the plant. After three years a crop is reaped annually.

Among the fibre-producing plants of Trinidad may be mentioned the *gemove* (*Malachra*); *bois ceip* (*Oreodaphne cernua*); *Gumbo mizse*, the pinquine or wild pine-apple; the Spanish needle (*Yucca*); and the *Sanseviera zeylanica*.

Consul Peirce states, in conclusion, that he has been informed that there is no machine now in use in the colony which obtains the fibre without destroying the substance of the fibre-ribs. The principal machine, if not the only one, now used in Trinidad and Tobago, is arranged for the operator to hold the blade of the plant in his hand, while the machine scrapes out the green and watery substance. The opinion has been expressed that if a machine could be introduced that would act somewhat on the principle of a cane-mill, in which the cane enters one side and comes out at the other thoroughly crushed and squeezed, a great advantage would be gained over the present practice.

BETTER COWS FOR THE DAIRY.[1]

THE need of better cows for the dairy is coming to be very generally appreciated. The dairy commissioner of Iowa is reported as saying that the average cow in that State gives but 3,000 pounds of milk annually, while good ones yield from 5,000 to 6,000 pounds. The director of the Vermont Station states that the average yield per cow in that State is only about 130 pounds of butter per annum, while there are thirty dairies in the State that average over 300 pounds per cow.

The director of the New York Station says, "New York has 1,500,000 milch cows, probably producing, on an average, less than 3,000 pounds of milk per year, and the annual average butter-product per cow for the State is undoubtedly less than 130 pounds. This should not be, when there are whole herds averaging 300, and some 400, pounds of butter per year for each cow. Animals producing these by no means phenomenal yields are not confined to any particular breed, and are often grades of our so-called native or no-breed animals. Proper selection, systematic breeding, and judicious feeding have produced these profitable animals and herds."

The difference in the milk-producing qualities of different cows is brought out very clearly by a series of experiments conducted at the Massachusetts State Station, of which Professor C. A. Goessmann is director. They are especially interesting, because the cows and their feed and care were such as are found on the better farms of Massachusetts; and the results, obtained with the appliances of a well-equipped experiment station, show in accurate and full detail the elements of actual profit and loss as they could not be found in ordinary farm experience.

These experiments have been made with twelve cows, and have continued over five years. Grade Jersey, Ayrshire, Devon, Durham and Dutch, and native cows were used. They were secured for the experiments a few days after calving, and fed until the daily yield fell below 5 or 6 quarts, when they were sold to the butcher. The length of the feeding-period, i.e., duration of the experiment with each cow, varied from 261 to 599 days. Hay, fodder, corn, corn-silage, green crops, roots, and corn-meal, wheat bran, and other grain, were used. The daily ration per head consisted of 18 to 20 pounds of dry fodder, or its equivalent of green fodder, and from 6½ to 9¾ pounds of grain. Careful accounts have been kept of the history of each cow, including breed, age, number of calves, length of feeding-period, amounts and kinds of fodder, yield of milk, chemical composition of feed, milk, and manure, cost of cow and feed, and values of milk and manure.

The following is a recapitulation of the financial record of the cows. The milk was reckoned at the price paid for it at the neighboring creameries. The value of the manure produced is calculated by assuming, that, of the total amount of food, 20 per cent would be sold with the milk, and the remaining 80 per cent saved as manure. As farmers in the region buy commercial fertilizers for the sake of their nitrogen, phosphoric acid, and potash, it was assumed that these same ingredients would be worth about as much, pound for pound, in the manure as in the better class of fertilizers, and accordingly the value of the manure was computed by taking the nitrogen as worth 16½ cents, phosphoric acid 6 cents, and potash 4¼ cents, per pound. The return for feed consumed represents what the feeder receives for labor, housing of cattle, interest of capital invested, risk of loss of animal, etc.

The most profitable cow was bought for $60, fed 584 days, and then sold for $28, making her actual cost $32, and the feed cost $135.05; so that the total cash outlay was $167.05. The milk brought $203.37 at the creamery, and the manure was estimated to be worth $56.93, making the total value received for feed consumed, $260.30. Subtracting the total cash outlay of $167.05 from this, there remains $93.25 as net return for feed consumed. Deducting the estimated value of the manure, the remainder, "return in excess of estimated value of manure," is $36.32. In the average for the twelve cows, the net return was $50.43; and the return in excess of the estimated value of the manure, only $15.13. With the least profitable cow, the cash outlay for cow and feed exceeded the value of the milk and manure by $3.97: in other words, the net return for feed consumed was $3.97 less than nothing. Subtracting the value of the manure, the total loss was $34.25; that is to say, allowing for the value of the manure, the results with the twelve cows varied from a gain of $93 to a loss of $3.97, or, if the value of the manure be left out of account, from a gain of $36.32 to a loss of $34.25.

It is noticeable that the profit or loss did not depend upon either the breed or the length of the feeding-period. The most profitable cow, and the least profitable but one, were both of the same breed. Of the two most profitable cows, one was fed for 584 days, and the other for only 278 days.

Two things, then, are brought out very clearly by these experiments. One is that in such localities as this, the value of the manure goes far to decide the profit in feeding dairy cattle. Another is that cows which would ordinarily pass for good ones may differ widely in product.

To the practical dairyman these experiments teach clearly the difference between cows which are profitable and those which are not, and the importance of selecting the best cows for his dairy and getting rid of the poor ones. In a larger sense, they illustrate to every farmer the importance of knowing accurately the condition of his business. Upon this its success or failure largely depends.

[1] From Farmers' Bulletin No. 2 of the United States Department of Agriculture.